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EXAMINER

SHAH, CHIRAG G

ART UNIT PAPER NUMBER

2616

DATE MAILED: 04/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/040,702

Applicant(s)

LEE ET AL.

Examiner

Chirag G. Shah

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 2/15/06.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1 sheet 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Webber (U.S. Pub No. 2003/0039209) in view of Shanley (PCI-X System Architecture, see IDS).

Referring to claim 1, Webber discloses in figure 2 and paragraphs 0017-0020 of a method of:

receiving a completion packet [acknowledgement positive or negative packet as disclosed in fig. 2 and paragraph 0018] at a receiving device [requesting device], the completion packet including a completor identification [as disclosed in 0017 and 0020, for example a positive acknowledgment is received to the requester from the responder for packet 1 as initially tagged by requester];

determining whether the completion packet received from the identified completor is expected by the receiving device [As disclosed in 0020 and figure 2, this determination is made by the requester when it receives a message from the responder by comparing based on sequence number of the last packet in the descriptor for the message with the sequence number of the acknowledgment received for that same message. In other words as further disclosed in 0020, if a request was made by the requester, the request tags (numbers) the packets by writing a

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sequence number in each packet header as they are transmitted, the responder transmits an acknowledgment back to the requester when it receives a packet, which includes the packet's sequence numbers]; and

discarding the completion packet if the completion packet is not expected [As disclosed in paragraph 0020-0021, if the responder detects a remote error in a packet of a message, it sends a negative acknowledgement to the requester while discarding any subsequent packets in the message. A remote error is an error detected by the requester after a packet has been received. Upon receiving the negative acknowledgement, the requester completes the message in error by writing a negative completion code to the CQ and the message is terminated/discarded] as claim.

*Webber fails to disclose wherein the receiving device includes a general input/output communication port implementing a communication stack including a transaction layer, a data link layer, and a physical layer, the transaction layer to receive the completion packet.* Shanley discloses on page 626, that the requester receives the completion packet via the transaction layer, and when the completion packet with the sequence ID supplied in the split completion address phase does not match any of its outstanding split transactions, the requester has two options, either to ignore the transaction or discard it because the requester did not request the data. Furthermore, it is clear from page 626, that receiving device receives from the completing device messages via the transaction layer (implementing end to end communication). Thus, in order for the packet to be read by the requesting device, it must follow the known OSI model or TCP/IP model to strip the stack from Transaction, Datalink and physical layers respectively. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Webber to include the teachings of discarding the completion packet if it

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was not expected received by the requester via the transaction layer as taught by Shanley. One is motivated as such in order to ensure reliability such that all acknowledgments are received for all pending and expected transactions.

Referring to claim 2, Webber discloses in paragraph 0026 and in figure 2&5 wherein determining whether the completion packet is expected includes determining whether the completion packet corresponds to any outstanding requests previously issued by the receiving device as claim.

Referring to claim 3, Webber discloses in paragraph 0026 of further comprising reporting an error condition as claim.

Referring to claim 4, Webber discloses in figure 2 and paragraphs 0017-0020 of a method, comprising:

- receiving a completion packet [acknowledgment positive or negative packet as disclosed in figure 2 and paragraph 0018] at a receiving device [requesting device], the completion packet [ack packet] including a completion status [positive, negative, retransmission as disclosed in 0018] and a completor identification [packet tag (sequence number) as disclosed in 0017];

- determining whether the completion packet includes a completion status other than successful [As disclosed in 0018-0020, a negative acknowledgment indicates that the responder has detected a remote error in a packet transmitted by the requester. The

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requester determines whether the ack packet includes a positive or negative packet completion status]; and

storing the completor identification in a first register (CQ) if the completion status is other than successful [As disclosed in paragraph 0020, upon receiving a negative acknowledgment, the requester completes the message in error by writing a negative completion code to the CQ and the message is terminated] as claim.

Referring to claim 5, Webber discloses in paragraphs 0019-0020 of further including indicating in a second register [in memory 102 called the completion Queue (CQ)] that an unsuccessful completion (negative acknowledgment) was received if the completion status is other than successful (a detected remote error) as claim.

Referring to claim 6, Webber discloses in paragraph 0018 and 0026 and in figure 2&5, further comprising reporting an error condition if the completion status is other than successful as claim.

Referring to claim 7, Webber discloses in figure 2 and in paragraphs 0017-0020 of a method comprising:

servicing a request packet [packet 1, packet 2, etc. of paragraph 0017] from a requesting device [101 in figure 2] at a completor device [responder 103 in figure 3], the request packet including a requestor identification and a tag [as disclosed in 0017, the

requester tags (numbers) the packets as they are transmitted by writing a sequence number in each packet header] ;

transmitting a completion packet with a completion status other than successful from the completer device to the request device if an error condition exist [As disclosed in figure 2, paragraph 0018, The responder transmits a negative acknowledgement indicating that the responder has detected a remote error in the packet transmitted by the requester]; and

Webber discloses in paragraph 0020, upon receiving a negative acknowledgment, the requester completes the message in error by writing a negative completion code to the CQ and the message is terminated. Webber fails to explicitly disclose of storing the requestor identification at a location in the completer device if the error condition exists. Webber discloses further in 0017-0019 that the respective paragraphs that the responder 103 transmits an acknowledgment (negative) back to the requester 102 when it receives a packet, which includes the packet's sequence number. *Webber further fails to disclose indicating in a register in the completer device that a completion packet with a completer status other than successful was generated/transmitted if the error exists.*

Shanley discloses in figures 17-2 and 17-3 of a split completion message with a tag field that the completer supplies to the requester. Furthermore, Shanley specifies in table 26-2 that a completion packet with a completer status (device specific error) other than successful is generated to be sent back to the requester. Therefore, it would have been to one of ordinary skills in the art at the time of the invention to modify the teachings of Webber to include a

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memory logic in the completer device as taught by Shanley for storing acknowledgment error tags in order to provide high reliability and low latency communication in the event of failure.

Referring to claim 8, Webber discloses in 0017 and figure 2 that the requester 101 tags the packet as they are transmitted, by writing a sequence number in each packet header. Webber further discloses in paragraph 0017-0018 that the responder 103 transmits an acknowledgment back to the requester 102 when it receives a packet, which includes the packet's sequence number. The responder transmits a negative acknowledgment when the responder has detected a remote error in a packet transmitted by the requester. *Webber, however, fails to explicitly disclose of storing the tag at a location in the completer device if the error condition exists.*

Shanley discloses in figures 17-2 and 17-3 of a split completion message with a tag field that the completer supplies to the requester. Furthermore, Shanley specifies in table 26-2 that a completion packet with a completer status (device specific error) other than successful is generated to be sent back to the requester. Table 17-2 clearly illustrates error completion of a read or write stored in the completer device if an error condition exists with a status message as a reason for error. Therefore, it would have been to one of ordinary skills in the art at the time of the invention to modify the teachings of Webber to include a memory logic for storing acknowledgment error tags as taught by Garcia in order to provide high reliability and low latency communication in the event of failure.

Referring to claim 10, Webber discloses in paragraph 0018, 0026 and figure 2 of further comprising reporting the error condition if it exists as claim.



Referring to claim 11, Webber discloses in paragraphs 0018-0019 wherein the completion packet further comprises a completion status such as a negative or positive acknowledgment.

Referring to claim 12, Webber discloses in paragraph 0019-0020 wherein determining whether the completion status is expected [if a positive ack is received for packet 1, the requester must determine that ack 1 does not complete the descriptor message A and that ack 2 does, ] further comprises determining whether the completion status is set as an unexpected result [the completion status is set as an unexpected results since the requestor may receive a completion status acknowledgment in a positive or negative form, see paragraph 0019-0020].

Referring to claims 13 and 15, Webber discloses in 0020 wherein a completion status other than successful may be at least one of an unsupported request, completor abort, malformed packet, and unexpected completion [the responder detects a remote error in a packet of a message (malformed packet), it sends a negative completion acknowledgment message to the requester, see 0020].

Referring to claim 14, Webber discloses in paragraph 0020 wherein transmitting a completion packet [positive ack 2] further comprises returning no data with the completion packet for a read completion [no data is returned and a message is considered complete when its completion code is written to the CQ, see 0019].

Referring to claim 15, Shanley discloses in table 17-2 and figure 17-3 on page 317 and page 626, table 26-2 wherein a completion status other than successful may be at least one of an unsupported request, a completer abort, and an unexpected completion.

Referring to claim 16, Shanley discloses in figure 17-3 wherein the completion header further includes a virtual channel ID field to identify a virtual channel of the completion packet.

Referring to claim 17, Shanley discloses on page 317, figure 17-3 and on page 474 wherein the completion header further includes an attribute field including at least one of the following attributes: a priority attribute, a transaction ordering attribute, and a cache coherency attribute.

Referring to claim 18, Shanley discloses in figure 17-3 and page 316 in the “Attribute Phase Format” section, wherein the completer identification includes a value that corresponds to an agent [completer device number, see figure 17-3] that completes the request.

Referring to claim 19, Shanley discloses on page 317, figure 17-3 and on page 474 wherein the completion header further includes: an attribute field including at least one of a priority attribute, a transaction ordering attribute, and a cache coherency attribute; and a virtual channel ID [see fig. 17-3] filed to identify a virtual channel of the completion packet.

Referring to claim 20, Shanley discloses in figure 17-3 and on page 316 wherein the completion packet includes a completion header having: a completor identification including a value that corresponds to the completor agent [completer ID identifies the originator of the completion transaction, see page 316 and figure 17-3]; and the completion status, wherein the completion status includes a value indicating the status of the completion packet [see table 17-2, status that may include error-free completion or error completion].

Referring to claim 21, Shanley discloses on page 317, figure 17-3 and on page 474 wherein the completion header further includes: an attribute field including at least one of a priority attribute, a transaction ordering attribute, and a cache coherency attribute; and a virtual channel ID [see fig. 17-3] filed to identify a virtual channel of the completion packet.

Referring to claim 22, Webber discloses in fig. 2 of a requester apparatus, comprising:  
receiving a completion packet [acknowledgement positive or negative packet as disclosed in fig. 2 and paragraph 0018] at a receiving device [requesting device], the completion packet including a completor identification [as disclosed in 0017 and 0020, for example a positive acknowledgment is received to the requester from the responder for packet 1 as initially tagged by requester];

determining whether the completion packet received from the identified completor is expected by the receiving device [As disclosed in 0020 and figure 2, this determination is made by the requester when it receives a message from the responder by comparing based on sequence number of the last packet in the descriptor for the message with the sequence number of the

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acknowledgment received for that same message. In other words as further disclosed in 0020, if a request was made by the requester, the request tags (numbers) the packets by writing a sequence number in each packet header as they are transmitted, the responder transmits an acknowledgment back to the requester when it receives a packet, which includes the packet's sequence numbers]; and

discarding the completion packet if the completion packet is not expected [As disclosed in paragraph 0020-0021, if the responder detects a remote error in a packet of a message, it sends a negative acknowledgement to the requester while discarding any subsequent packets in the message. A remote error is an error detected by the requester after a packet has been received. Upon receiving the negative acknowledgement, the requester completes the message in error by writing a negative completion code to the CQ and the message is terminated/discarded] as claim.

*Webber fail to disclose wherein the apparatus comprises a communication stack to communicate with another apparatus within a data processing system over a point-to-point interconnect, the communication stack having a transaction layer, a data link layer, and a physical layer; and wherein the transaction layer receives a completion packet.* Shanley discloses on page 626, that the requester receives the completion packet via the transaction layer, and when the completion packet with the sequence ID supplied in the split completion address phase does not match any of its outstanding split transactions, the requester has two options, either to ignore the transaction or discard it because the requester did not request the data. Furthermore, it is clear from page 626, that receiving device receives from the completing device messages via the transaction layer (implementing end to end communication). Thus, in order for the packet to be read by the requesting device, it must follow the known OSI model or TCP/IP

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model to strip the stack from Transaction, Datalink and physical layers respectively. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Webber to include the teachings of discarding the completion packet if it was not expected received by the requester via the transaction layer as taught by Shanley. One is motivated as such in order to ensure reliability such that all acknowledgments are received for all pending and expected transactions.

Referring to claim 23, Shanley discloses wherein to determine whether the completion packet is expected includes determining whether the completion packet corresponds to any outstanding requests previously issued by the apparatus [Shanley discloses on page 626, that when the requester receives the completion packet via the transaction layer, it determines whether the tag portion of the sequence ID supplied in the split completion's address phase match any of its outstanding and when the completion packet with the sequence ID supplied in the split completion address phase does not match any of its outstanding split transactions, the requester has two options, either to ignore the transaction or discard it because the requester did not request the data.].

Referring to claim 24, Shanley discloses further comprising the transaction layer to report an error condition if the completion packet is not expected [Shanley discloses on page 626, that the requester receives the completion packet via the transaction layer, and when the completion packet with the sequence ID supplied in the split completion address phase does not match any of its outstanding split transactions, the requester has two options, either to ignore the transaction

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or discard it because the requester did not request the data. Furthermore, it is clear from page 626, that receiving device receives from the completing device messages via the transaction layer (implementing end-to-end communication)].

### *Response to Arguments*

3. Applicant's arguments with respect to claims 1-8 and 10-24 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chirag G. Shah whose telephone number is 571-272-3144. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 571-272-7682. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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cgs  
April 10, 2006

A handwritten signature in black ink, appearing to read "Chirag Shah", written in a cursive style.

Chirag Shah  
Patent Examiner, Division 2616